

Original Article

Prevalence of early childhood caries among 3-5 year old pre-schoolers in schools of Marathahalli, Bangalore

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ABSTRACT

Background: Dental caries among preschool children is still a major public health problem in many developing countries including India. Hence the aim of the present study was to find out the prevalence of Early Childhood Caries among 3-5 year old pre-schoolers in schools of Marathahalli, Bangalore.

Materials and Methods: A cross sectional study was conducted on 717 pre-schoolers in 6 schools of Marathahalli. Clinical examination was performed and deft index was recorded using Gruebell's criteria. Early Childhood Caries was diagnosed using Early Childhood Caries Diagnostic Criteria, consistent with the NIDCR workshop statement. Data was analysed using SPSS 15.0 and descriptive statistics was applied. Chi-square test was used to find out the significant differences. The level of significance was taken at P value < 0.05 .

Results: Prevalence of early childhood caries was 40% with a mean deft of 1.89 (+3.3) and Significant Caries Index score was 5.51. 44.8% of 3 year old had Early Childhood Caries, 35% of 4 year old children and 41% of 5 year old had Early Childhood Caries. Almost, all of deft was due to untreated caries.

Conclusion: The results of the present study calls for a need to focus on pre-schoolers' oral health and parental education for prevention and early detection of Early Childhood Caries. A high Significant Caries Index in this study population indicates a more targeted approach for high risk pre-schoolers.

Key Words: Early childhood caries, pre-schoolers, significant caries index

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INTRODUCTION

Early Childhood Caries is a significant public health problem in both developing and industrialized countries which continues to affect babies and preschool children worldwide.^[1,2] Early childhood caries (ECC) is not life-threatening but it may contribute to suboptimal health and failure to thrive.^[2,3]

ECC is a chronic, transmissible, infectious disease with a complex and multifactorial etiology.^[4] The short-term

consequences of untreated decay in children's teeth include pain, with up to 12% of 5-year olds reported to have experienced tooth ache, systemic infection and abscesses.^[5] Untreated caries may lead to early loss of the primary dentition and affect the growth and maturation of the secondary, adult dentition. In fact, decay in the primary dentition is the best predictor for decay in the permanent dentition; poor dental health and disease often persist to adulthood, affecting speech articulation, growth, and dietary practices. Thus, poor dental health has a significant impact on the growth and cognitive development of child by interfering with nutrition, concentration and subsequently school participation.^[6-8]

ECC prevalence varies from population to population; however, children of disadvantaged subpopulations, regardless of race, ethnicity or culture, have been found to be most vulnerable.^[2] In England the

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prevalence reported ranges from 6.8-12% and in USA prevalence varies from 11.0-53.1%.^[9] In Asia, in the Far East region, which seems to have one of the highest prevalence and severity for the disease, the prevalence in three-year-olds ranges from 36 to 85%,^[9-14] while in India a prevalence of 44% has been reported for caries in 8- to 48-month-olds.^[11] Another study reported a caries prevalence of 54.1% in the preschool children of Hubli and Dharwad city.^[9] There has been a considerable amount of information about prevalence of Early Childhood Caries in pre-schoolers in other parts of the world, whereas in India, not much baseline data is available.

Hence the aim of this study was to find out the prevalence of Early Childhood Caries among 3-5 year old pre-schoolers in kindergartens of schools of Marathahalli, Bangalore.

MATERIALS AND METHODS

A cross sectional study was conducted among 3-5 years old pre-schoolers in schools of Marathahalli, Bangalore. A list of schools having kindergartens was obtained from Deputy Director of Public Instructions (DDPI) Office, Bangalore South. All the schools with kindergartens in Marathahalli were included in the study. Out of the eight schools, six schools permitted to conduct the study. Before conducting the study, ethical clearance was obtained from the institutional review board. Also, prior permission to conduct the study was obtained from the authorities of respective schools. Voluntary written informed consent was obtained from parents of the children participating in the study before the clinical examination.

All the children aged 3-5 years attending the schools of Marathahalli, Bangalore whose parents gave consent to participate in the study and who co-operated during the oral examination were included in the study. Children with acute infections of oral cavity which interfered with oral examination were excluded from the study. A total of 717 pre-schoolers participated in the study.

Before the start of the survey, intra-examiner reliability was assessed on 10 subjects on different days and the examiner repeated her examinations on them. The Kappa co-efficient value for intra-examiner reliability with respect to decayed, indicated for extraction and filled teeth index (deft) was 0.8 which reflected high degree of conformity in observations. A pilot study was carried out in one school chosen

using simple random sampling, on all the 3-5 year old pre-schoolers present on the day of examination to check the feasibility and relevance of proforma, to have prior idea regarding the estimate of the time taken to examine each patient and the survey was planned accordingly.

Early Childhood Caries was diagnosed using Early Childhood Caries Diagnostic Criteria, consistent with the NIDCR (National Institute of Dental and Craniofacial Research) workshop statement.^[12] Both d_1 and d_2 stages of caries were recorded. Clinical examination was conducted at respective schools by making child sit on ordinary chair with back rest, with the examiner sitting in front of the chair and deft index was recorded using Gruebell's criteria. The d component included decayed deciduous teeth (both initial and cavitated lesions), e component included deciduous teeth extracted due to caries or indicated for extraction, and f included filled teeth.

The data obtained was statistically analysed using SPSS Version 15.0. Descriptive statistics that included mean, standard deviation and percentages were calculated for each of the categories. Student *t*-test, ANOVA was used to find out significant differences in mean deft between groups. Categorical data were analysed by Chi-square test for differences between groups. Significance for all statistical tests was predetermined at a probability value of 0.05 or less.

RESULTS

The study population consisted of 717 pre-schoolers in the age range of 3-5 years. Out of 717 children, 317 (44.2%) were females and 400 (55.8%) were males. 201 (28%) were 3 years old, 243 (33.9%) were 4 years old and 273 (38.1%) were 5 years old with a mean age of 4.10 (\pm 0.8) years.

The prevalence of Early Childhood Caries among the study population was 40% with a mean dmft of 1.89 ± 3.3 while the SiC index of the study population was 5.51. Out of 201 3 year old children, 90 (44.8%) had Early Childhood Caries and 111 (55.2%) did not had caries. Among 243 4 year old children, 85 (35%) had Early Childhood Caries and 158 (65%) were caries free. Out of 273 5 year old children, 112 (41%) had Early Childhood Caries and 161 (59%) did not had caries. 126 (39.7%) females and 161 (40.3%) males had early childhood caries [Table 1].

The mean dmft of 3 year old was 1.86 ± 2.9 , of

Table 1: Age and gender wise prevalence of early childhood caries

Caries status	3 year		4 year		5 year		Total (%)
	Boys (%)	Girls (%)	Boys (%)	Girls (%)	Boys (%)	Girls (%)	
Caries free	67 (9.3)	44 (6.1)	87 (12.1)	71 (9.9)	85 (11.8)	76 (10.6)	430 (60)
Affected	48 (6.7)	42 (5.8)	49 (6.8)	36 (5.0)	64 (8.9)	48 (6.7)	287 (40)
Total	115 (16.1)	86 (11.9)	136 (18.9)	107 (14.9)	149 (20.7)	124 (17.3)	717 (100)

4 year old was 2.0 ± 3.8 and in 5 year old was 1.81 ± 3.1 . This difference was not statistically significant ($P = 0.81$). The mean dmft in females was 1.71 ± 2.9 while in males it was 2.03 ± 3.6 . However, this difference was also not statistically significant ($P = 0.198$) [Table 2].

The pattern of tooth wise distribution of early childhood caries among the study population showed that the most severely affected teeth were maxillary central incisors (19.5% and 20.2% for maxillary right and maxillary left central incisor respectively) followed by maxillary lateral incisors (14.9% and 14.6% for maxillary right and maxillary left lateral incisor respectively) and mandibular second molars (14.9% on right side of the arch and 14.4% on left side of the arch). The least severely affected teeth were mandibular incisors. However, the caries pattern was fairly symmetrical across the arches [Table 3].

DISCUSSION

This present study was conducted on 717 pre-schoolers aged 3-5 years in kindergartens of schools of Marathahalli, Bangalore, Karnataka, India. Early Childhood Caries is a lifestyle disease that begins when the child's teeth erupt in the oral cavity. The distinctive pattern of decay rapidly spreads from one tooth to another and involves the surfaces of teeth that are usually not at risk.

Caries was recorded using the def index. The children were examined both for non cavitated (including white spot lesions) and cavitated lesions. No attempt was made to use a dental explorer to confirm cavitation of the lesions due to the young age of the children. This ensured their compliance with the examination without adversely affecting their cooperation and behavior in the dental environment in future.

This study documented a 40% prevalence of early childhood caries which is in equivalence to Karnataka state average (40.5%),^[13] our country average (40-60%, 52%)^[14] and studies done by Saravanan S^[1] (44.4%) and Simratvir, et al.^[9] (52.2%).

Table 2: Mean dmft of study population according to age and gender

Gender	Mean dmft		
	3 year	4 year	5 year
Males	1.86±3.21	2.26±4.22	1.95±3.20
Females	1.86±2.65	1.65±3.15	1.65±2.92
Total	1.86±2.98	2.0±3.80	1.81±3.10

Table 3: Pattern of tooth wise distribution of early childhood caries

Toothwise distribution	Maxillary right (%)	Maxillary left (%)	Mandibular left (%)	Mandibular right (%)
Central incisor	148 (19.5)	145 (20.2)	2 (0.3)	1 (0.1)
Lateral incisor	107 (14.9)	105 (14.6)	1 (0.1)	2 (0.3)
Canine	51 (7.1)	54 (7.5)	29 (4.0)	35 (4.9)
First molar	77 (10.7)	80 (11.2)	103 (14.4)	94 (13.1)
Second molar	55 (7.7)	54 (7.5)	107 (14.9)	103 (14.4)

Caries prevalence (40%) was higher in this population in comparison to studies conducted by Wyne,^[6] Askarizadeh, et al.^[7] who reported a prevalence of 27.3% and 17.2% respectively. On the other hand, the prevalence of the present study was less in comparison to studies done by Mazhari^[15] and Sadeghi.^[16] This can be attributed to the inclusion of early carious lesions and non cavitated lesions into consideration for diagnosis in the present study.

The study population in the present study had a mean dmft of 1.89 ± 3.3 . This mean dmft values are in conformity with the Karnataka State average (1.7),^[13] studies by Simratvir, Sudha P., Horowitz, et al. (mean dmft 1.93^[17]) and Brothwell, et al. (mean dmft of 2.0 ± 3.3). However, it was much lesser in comparison to study done by Wyne^[6] who reported a mean dmft of 8.6 (± 3.4) and Sadeghi^[16] who reported a mean dmft of (2.6 ± 3.15). Since the caries was diagnosed entirely on visual examination in the present study, this certainly resulted in an underestimation of the actual caries status; hence it is possible that the true carious lesion prevalence would be higher than reported in our present study. The other contributory factors could be varied diagnostic criteria used for diagnosis of Early Childhood Caries,

genetic predisposition, lack of parental education and varied socioeconomic status among the population studied, lack of dietary and oral hygiene discipline, in addition to very late first dental visit for routine checkup.^[6,18-20]

The mean dmft among the 3 year old children was 44.8% (dmft 1.86 ± 2.9) which was less in comparison to that reported by Schroth, *et al.* (12.7 ± 5.6). Similar difference was found for 4 year old and 5 year old children who reported a mean dmft of 2.0 ± 3.8 in 4 years old and 1.81 ± 3.1 in 5 years old in the present study while it was 13.9 ± 2.8 in 4 years old and 13.7 ± 2.9 in 5 year old according to Schroth, *et al.*^[3] However the results of the present study were similar to those done in Ludhiana, Hubli-Dharwad which shows that most of the lesions recorded were of d category (decayed teeth, which required treatment). This clearly reflect that the availability of oral health services, oral health awareness, socioeconomic status and attitude of masses towards oral health greatly influence the distribution of def components.^[9,10]

The mean dmft was slightly high among boys compared to the girls with a mean dmft of 2.03 ± 3.6 and 1.71 ± 2.9 respectively which was similar to the studies by Simratvir, *et al.*, Saravanan, Wyne, *et al.*, Askarizadeh, Aneundi and Carino, Shinada and Kawaguchi.^[21] However this difference was not statistically significant ($P = 0.081$) which was consistent with the other studies.^[6-10,22,23]

The early childhood caries pattern among the present study group showed that maxillary right and left central incisors showed highest prevalence of caries (19.5% and 20.2% respectively) followed by mandibular second molars (14.9% and 14.4% on left and right side respectively) and the mandibular incisors showed the lowest prevalence of caries being 0.3% and 0.1%. It is noteworthy that majority of the children, who had decay, had anterior tooth involvement as well; clearly indicative of the fact that besides oral hygiene, erratic nursing habit might have also contributed to caries.^[9] This result agrees with those reported by Wyne, *et al.* whose study also showed similar results. Lack of dexterity in this age group and negligence on the part of caretakers might have accounted for poor oral health. Also, besides oral hygiene, erratic nursing habit might have contributed to the decay as well.

The present study showed a SiC index value of 5.51 for 3-5 year old pre-schoolers. This was slightly higher

than the SiC index of 4.11 in Brazilian population reported by Carvalho, *et al.*^[24] This aims at focusing the interest on the neglected and needy high risk group pre-schoolers and calls for a more specific and targeted actions. Past caries experience is an important indicator for future caries risk and children with high caries levels will most likely be those adults requiring complex and expensive treatments in the future. Effective early prevention measures will cut down treatment expenditure for this caries prone group in their adult life. Thus, the aim should be population based prevention to reduce the overall caries burden of this underprivileged preschool age group.^[16,25,26]

CONCLUSION

Early Childhood Caries is a public health problem that warrants the attention and resources of the community. This study showed a 40% prevalence of early childhood caries among 3-5 year old pre-schoolers in Marathahalli, Bangalore. Efforts to increase awareness of the public on the prevalence, severity and impact of ECC on general and oral health, growth and development of children should be undertaken. Awareness on the diagnosis, prevention and treatment of ECC should be increased among dentists, physicians, paediatricians, nurses, midwives and other community health workers involved in care of preschool children. Thus, the result of the present study calls for a need to focus on pre-schoolers' oral health and parental education for prevention and early detection of Early Childhood Caries.

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